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Factors Related to Primary Employment and Wage Income in Industrial Parks in Nonmetropolitan Ohio

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The purpose of this study is to analyze the impact of industrial parks on primary employment and income in nonmetroplitan communities. Industrial parks are a development mechanism numerous community groups have used in attempts to improve income and employment alternatives in their respective communities.[3] The major thrust of the analysis is to measure the success of these parks in nonmetropolitan Ohio in generating primary employment and income, and to determine the locational, community, and park characteristics correlated with this success. Such information should be helpful in assisting communities and private developers with decisions on the advisability of offering and/or expanding industrial park developments.

THE PROBLEM

Considerable literature exists on the historical out-migration problem of nonmetropolitan areas and approaches to dealing with that problem (18, 23, 26). A repeated recommendation has been rural industrialization with its consequent employment and income impacts (1, 7, 11). Improved employment alternatives have been recommended as an incentive for potential migrants to remain in their home localities rather than migrate to larger metropolitan areas which are perceived to have more jobs and higher incomes.

Several studies have identified markets, labor, transportation, and raw materials as direct production factors[4] affecting firm location decisions (17, 19, 24). In fact, at least one author has referred to these four factors as prerequisities to location decisions (17). Other studies have identified various indirect production factors such as community attitudes, environmental amenities, and services and facilities provided to newly locating firms as important to location decisions (9, 21, 24).

McMillan states that firm location decisions are two-stage processes (17). The first stage involves the selection of a geographic region within which profitable production is feasible primarily from the standpoint of direct production factors. The second stage considerations involve primarily indirect production factors. The importance of these indirect production factors has increased relative to the direct production factors as industries have decentralized from metropolitan areas.

Decentralization of industry has been associated with the expansion and dispersal of market concentration advantages, the development of the interstate highway system, and the discovery of generally lower rates of labor turnover and absenteeism in nonmetropolitan areas. Thompson (22) suggests a filtering down theory as an alternative explanation of the decentralization process:

> "In national perspective, industries filter down through the system of cities, from places of greater to lesser industrial sophistication. Most often, the highest skills are needed in the difficult, early stage of mastering a new process, and skill requirements decline steadily as the production process is rationalized and routinized with experience."

Regardless of the explanation, decentralization of industry has resulted in indirect production factors playing an increasing role in differentiating among communities for prospective firms. The direct production factors represented primarily by geographic locational characteristics remain important, but are no longer specific to metropolitan areas. Various services and facilities available in communities and/or industrial parks represent many of the indirect production factors. Accordingly, industrial parks have been developed by many nonmetropolitan communities in an effort to attract industry to their respective locales.

Not all communities are successful in attracting firms to their parks. It has been estimated that 14,000 industrial development organizations exist, but there are only 500 to 700 new plant locations per year (25). The competition is intense. Only those parks and park locations which best meet individual

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[3]Industrial park, nonmetropolitan, and other terms are defined in a glossary of terms, Appendix I.

[4]Direct production factors are related to a firm's basic functions of assembling inputs, transforming inputs to output, and transporting output to markets where sales transactions are completed. Indirect production factors may enhance operation of the above processes, but are not direct components of them.

industrial needs will be selected by firms as new locations. Policy makers must be cognizant of what factors have been important in generating income and employment alternatives in existing nonmetropolitan industrial parks. Identification of these factors can assist developers in determining the advisability of offering an industrial park in their communities. If these factors are lacking, an industrial park may not be the best method for generating employment and income opportunities for the local labor force.

Current information on industrial parks is scarce. The location of most nonmetropolitan industrial parks in Ohio is not generally known even by the Ohio Department of Economic and Community Development. Only limited information exists on the success some of these parks have had in generating income and employment opportunities. Accordingly, the specific objectives of this study were to:

- Locate nonmetropolitan industrial parks in Ohio and inventory their locational, community, and specific park characteristics.
- Measure success of nonmetropolitan industrial parks in terms of primary income and employment generated.
- Determine the locational, community, and park factors associated with variation in primary employment and income generated by the nonmetropolitan industrial parks in the sample.

GENERAL CONCEPTUAL MODEL

The relationship between primary employment and income impacts and the subsets of locational, community, and park factors related to these impacts may be expressed as follows:

$$N \text{ or } Y = f(L_{1-n}, C_{1-n}, P_{1-n}) \quad (1)$$

where:
N = primary employment
Y = primary income
L = geographic location factors
C = community factors
P = park factors

Primary employment and income are proxies for the improvement in employment and income alternatives in the community. Consideration of both primary and secondary employment and income impacts would be a more comprehensive measure of economic impact and would strengthen the conclusions from the analysis. However, obtaining reliable data on secondary employment and income impacts proved beyond the scope and resources of this research effort. Likewise, environmental, sociological, and local government fiscal impacts are not explicitly included in this analysis. Total and per acre primary employment and income impacts are analyzed and the results are compared. Total impacts represent the primary employment and income impacts in the communities, while the per acre impacts reflect primary employment and income density in the industrial parks surveyed.

Characteristics of industrial park locations in geographic space are intended to serve as proxies for the direct production factors of markets, labor, transportation, and raw materials. Nearness to markets, labor, and raw materials facilitates acquiring labor to transform raw materials into products as well as getting products to market. Availability of air, water, rail and/or highway transportation facilitates the movement of products to markets. Thus, location factors reflect distance to markets, labor, and raw materials and in turn transport costs (9, 15, 21).

Various community factors may be viewed as expressions of both direct and indirect production factors affecting firm location decisions. These decisions in turn result in the generation of employment and income. The quality and activity of the local labor force are included in this category. In addition, the size of the community adjacent to the industrial park may be a proxy for labor force availability as well as for various types of commercial, industrial and retail support establishments.[5] The indirect production factors might include community attitudes, environmental amenities, and various types of services and facilities available to park occupants.

Collison (9) states that attitudes are "the sum total of the large and small actions that make doing business in a community a pleasure or a burden." Obtaining direct measures of community attitudes toward industry in a large number of communities is a major undertaking. Accordingly, availability of various groups to assist industry and the community's willingness to tax itself and to provide various utilities and services to park occupants are suggested as proxies for community attitudes. Environmental amenities relate to the healthful and pleasing aspects of the local community and may include such things as lakes, forests, and parks.

Specific industrial park characteristics are viewed primarily as proxies for indirect production factors affecting firm location decisions. Most of these factors involve various types of services and facilities provided to park occupants by the park's public or private owners. Based on a review of literature (5, 6, 9, 10, 11, 12, 20) and discussions with several developers and firm managers, age, size, various types of legal control measures, improvements, facilities, and price concessions are park factors hypothesized to be important in firm location decisions.

[5]Presence of services is closely related to but not synonomous with the size of the incorporated unit. Time and financial restraints prohibited measuring the size of the more closely related trade area (8).

SAMPLING AND DATA COLLECTION

Since very little secondary data existed on the location of Ohio nonmetropolitan industrial parks, an attempt was made to identify the entire population through several secondary data sources, including trade publications. The list was updated by telephone to secure names of industrial parks, individuals connected with them, and appropriate addresses. With completion of this procedure, a final list of 94 potential observations was obtained. The list appeared to be reasonably complete for the nonmetropolitan areas under study.

Empirical estimation of the model involved both primary and secondary data. Data on variables specified in the conceptual model, but not available from secondary sources, were collected from primary sources with the use of a mailed survey instrument and follow-up telephone interviews.[6] Exact locations of parks also needed to be determined in order to compute distance measurements from an Ohio highway map. Therefore, an appropriate county map was included with each instrument for the respondent to designate exact location of the park. A chart on park occupants was also included to determine what firms were present and where they were located. This chart was used in conjunction with the Ohio Directory of Manufacturers in determining which firms may have been in-town movers to an industrial park.

The instrument was pretested to assess its weaknesses. Three personal interviews were conducted and four responses were solicited by mail. The major problem was length. To compensate for this, the questionnaire was divided. Where a community had a full-time Chamber of Commerce representative, the representative was sent the map and chart and the remainder was sent to the park manager or representative. Where there were no full-time Chamber of Commerce representatives or where the Chamber of Commerce sponsored the park, an entire questionnaire was sent.

Information was returned on 32 of the 94 potential observations for a response level of 34 percent. Six of these observations proved not to be industrial parks as defined for purposes of this research. To improve the response level, a telephone follow-up was initiated and the questionnaire was re-administered. From this follow-up, 14 more observations were found not to qualify for this study's definition of an industrial park, which reduced the total population to 72. Fifty-two usable questionnaires were completed from the population of 72 for a response level of 72 percent.

[6]Copies of the complete questionnaire may be obtained from the authors.

CHARACTERISTICS OF PARKS SURVEYED

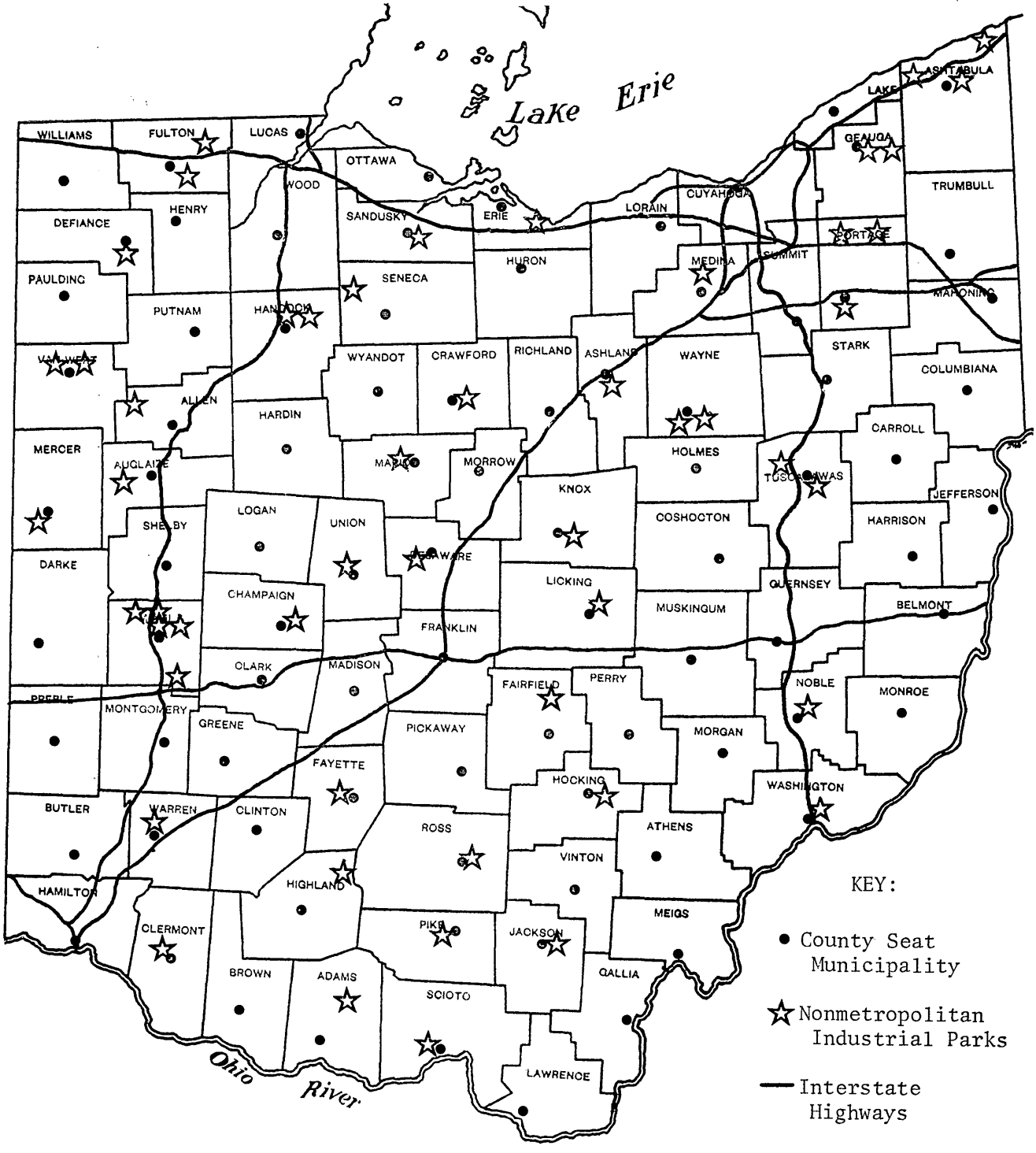
Figure 1 shows the locations of the 52 industrial parks surveyed in nonmetropolitan Ohio. To be included in the survey, parks had to be located in or adjacent to municipalities of less than 50,000 population and in counties with population densities of less than 450 people per square mile. The 52 parks were located in or adjacent to 46 incorporated municipalities in 38 of Ohio's 70 nonmetropolitan counties. Fifty-one percent were associated with municipalities of less than 10,000 population and 29 percent were associated with municipalities of less than 5,000 population. Table 1 presents a summary of the characteristics of the parks surveyed. Frequency distributions of some of these characteristics are presented in Appendix II.

Municipalities associated with the parks surveyed ranged from a population of 1,629 to 41,836, with a mean of 12,695. Fifty-seven percent of the communities had a full-time Chamber of Commerce representative and 63 percent of the communities subsidized the extension of some services (usually water) to the park. The parks were located an average of 35 miles (range of 15-83 miles) from an SMSA core city and 15 miles (range of 1-69 miles) from the nearest interstate highway interchange.

The average size of the parks was 137 acres, with a range of 8 to 687 acres. The average age of the parks was 7 years, with a range of 1 to 23 years. Almost half (46 percent) of the parks involved either total or partial public sponsorship, with the remainder (54 percent) fully private. Twenty-two percent of the parks had made one or more speculative building shells available. In 59 percent of the cases, there was a railroad siding in the park. Price concessions were given to occupants by sellers of the property in 16 percent of the parks. The average sale price was $6,492 per acre, and ranged from $1 to $23,500 per acre. Considerable variation existed among the parks in the number and type of restrictions and controls imposed on park occupants.

The 52 industrial parks surveyed represent 6,943 acres in nonmetropolitan Ohio communities. Thirty-three percent of this acreage was occupied, leaving 4,650 acres available for occupancy. All but nine of the parks had at least one operational firm. The average park had 3.6 firms, with a range of 0 to 18 firms. The 43 partially occupied parks represented 13,354 jobs and total wage income of $102,014,950. On average, the 43 parks provided 256 jobs and $1,961,826 of primary annual wage income. The nine empty parks included 1,322 acres of available land. A descriptive comparison of the empty and the 75 percent or more occupied parks is presented in Appendix III.

FIGURE 1.—Locations of industrial parks in nonmetropolitan Ohio survey, 1974.



TOTAL IMPACTS STATISTICAL MODEL AND RESULTS

The elimination and/or combination of some redundant variables and the development of proxy measures for others resulted in the following linear statistical model. The model is concerned with estimating the impact of several geographic location, community, and park factors on total primary employment and income in the industrial parks surveyed and is specified as follows:

$$N \text{ or } Y = a - b_1 L_1 - b_2 L_2 + b_3 C_1 \ldots + b_6 C_4 + b_7 P_1 \ldots + b_{15} P_9 + e \quad (2)$$

where:

N = primary employment within park in 1974 (no. of employees)
Y = primary wage income within park in 1974 ($000)
L_1 = road distance to nearest SMSA core city (miles)
L_2 = road distance to nearest interstate highway interchange (miles)
C_1 = population of local municipality in 1970 (00)
C_2 = 1, full-time Chamber representative; 0, otherwise
C_3 = average annual unemployment rate in county over life of park (percent)
C_4 = county property tax rate in 1974 (mills)
P_1 = size or area of park (acres)
P_2 = age of park (years)
P_3 = number of methods used to control park
P_4 = number of use restrictions
P_5 = number of user restrictions
P_6 = weighted number of improvements available
P_7 = 1, speculative building ever made available; 0, otherwise
P_8 = 1, railroad siding in the park; 0, otherwise
P_9 = 1, park sponsored by public; 0, otherwise
e = error term

Primary employment and income are proxies for improvement in employment and/or income alternatives in the community. Primary employment is the number of full-time equivalent employees in a park at the time of the survey in 1974. Primary income is measured in terms of annual wage income in a park in 1974. Payroll in a park would have been a more accurate gauge, but it was not available. Some downward bias results from the omission of salary income. However, if management or salary income is

TABLE 1.—Descriptive Statistics for the Community, Geographic Location, and Park Factors Associated with a Sample of Industrial Parks in Nonmetropolitan Ohio (n = 52), 1974.

Factors	Mean	Percent	Standard Deviation	Range
Primary Impact				
Primary employment (persons)	256		350	0-1500
Primary annual wage income	$1,961,826		$3,043,000	$0-13,104,000
Community				
Population of local municipality	12,695		10,165	1,629-41,836
Presence of full-time Chamber of Commerce representative		57		
Community subsidized extension of services to park		63		
County property tax rate (mills)	42.0		6.8	26.75-62.32
Average annual county unemployment rate (%)	4.8		1.8	2.8-9.4
Geographic Location				
Distance to nearest SMSA core city (miles)	35		15	15-83
Distance to nearest interstate highway interchange (miles)	15		16	1-69
Park				
Number of firms in park	3.6			0-18
Size of industrial park (acres)	137		123	8-687
Age of industrial park (years)	7		5	1-23
Number of methods used to control park development	1.9		0.9	1-4
Number of restrictions on use of park	6		2	1-10
Number of restrictions on users of park	0.8		0.7	0-3
Index of improvements available*	16.3		2.2	9-19
Speculative building shell ever made available in park		22		
Presence of a railroad siding in park		59		
Number of services made available by park	1.8		1.6	0-5
Park sponsored by public		46		
Price concession given an occupant by seller of property		16		
Sales price of park land (per acre)	$6,492		$4,195	$1-23,500

*Each essential improvement weighted three times; i.e., electric power, paved access roads, sewer, telephone, and water (16).

a fairly constant and relatively small proportion of total income of the firms in the sample, this omission will not be problematic in comparing wage income among the industrial parks surveyed.

Primary income and employment in an industrial park may not represent net additions to primary employment and income in the community. Some park employees may have left other jobs within the same community which were not subsequently filled. On the other hand, many park employees may be receiving higher incomes than they would have if their previous employment had been continued. These factors may tend to be off-setting.

There are other cases where firms have moved from one location in a community to an industrial park location within the same community. In this latter case, the following adjustments were made based on consultation with the firms in question:

1. Where a firm would have remained in the community regardless of the presence of an industrial park, none of the firm's employment or income is counted.
2. Where a firm added employees to its operations due to its locating in the industrial park, those additional jobs and income are counted.
3. Where a firm would have left the community if it had not been for the industrial park, the total employment and income are counted.

The two location variables (L_1 and L_2) are measured in road miles. Distance to an SMSA core city (L_1) serves as a proxy for the advantages associated with a market location. Distance to an interstate highway interchange serves as a proxy for the availability of transportation for both raw materials and finished products. Both variables are hypothesized to have a negative relationship with primary employment and wage income within the industrial park.

Population of the local municipality (C_1) is intended to serve as a proxy for the prevalence of various commercial, industrial, and retail support establishments, health services, and labor force in the community. It is hypothesized to be positively related with the dependent variables (8). A full-time Chamber of Commerce representative (C_2) represents the presence of one type of potential planning and facilitating group for industrial development. This dummy variable is expected to be positively related to primary employment and wage income.

Average annual unemployment rate in the county (C_3) was calculated for the years the park had been in operation prior to the survey. This variable is intended to reflect the availability of a pool of labor. As such, it is expected to be positively related to both primary employment and income in the park. The county tax or millage rate (C_4) was intended to reflect the willingness of the local population to tax itself for the provision of public facilities and services.

Acreage of the park (P_1) represents available space for existing firms in all cases, and in the partially occupied parks it represents space for expansion and new plant construction (5, 14, 17). It is expected to have a positive relationship with primary employment and wage income.

Age of the park (P_2) reflects the length of time the park has had to attract firms. Firms may be hesitant to locate in a park until some time has passed to test its longer run viability. Even after firms decide to locate, time is required to become operational in the park. A positive relationship is hypothesized between this factor and primary employment and wage income.

Variables P_3, P_4, and P_5 are measures of various control mechanisms which are hypothesized to minimize conflict situations and enhance environmental amenities of a park (11). In the case of P_3, the control methods include purchase agreements, lease conditions, individual deed restrictions, and zoning ordinances. Variable P_4 involves use restrictions such as required landscaping, controlled sign use and building construction, building set-backs, prohibition of residential construction and outdoor storage, required off-street parking and loading areas, screening of outdoor storage, and percent of landsite which may be covered by a building. Under variable P_5, users of the park may be limited to heavy manufacturing, medium manufacturing, light manufacturing, or miscellaneous operations. These three control variables P_3, P_4, and P_5 measure the number of control methods, use, and user restrictions, respectively, and are expected to be positively related to primary employment and wage income.

Variables P_6, P_7, P_8, and P_9 reflect various types of improvements and facilities offered by an industrial park. These factors are expected to increase a park's attractiveness to locating firms and thus increase primary employment and wage income impacts of the park (14, 15). Variable P_6 is a weighted index of the number of electric power, water, telephone, sanitary sewer, paved access road and internal street, storm sewer, and gutter and curb improvements available in a park. The first five "essential" improvements are given a weight three times the other factors to account for their greater importance (16). Variable P_7 is a dummy variable reflecting whether or not a speculative building shell was ever made available

in a park. Variable P_8 is also a dummy variable indicating the presence or absence of a railroad siding in the park. Park sponsorship (P_9) is a dummy variable indicating whether the park is publicly or privately sponsored.

An early specification of the statistical model also included a dummy variable indicating whether or not the community had subsidized the extension of utilities to the park. This variable was positively correlated with the public sponsorship variable (P_9), making it impossible to separate their respective net effects on primary employment and wage income impacts. Further investigation revealed that most of the public parks in the sample had subsidized utility extensions. Accordingly, the community subsidy variable was dropped from the model.

The linear statistical model (equation 2) was estimated by ordinary least squares. In Table 2, the results for the total primary employment and wage income equations are presented. The variables explain 70 percent of the variation in total primary employment and 66 percent of the variation in total primary wage income. The F-ratios for both equations are significant at the 1 percent level. Significance of the individual variables in the equations is designated for the .01, .10, and .20 probability levels. The 20 percent level of significance, in particular, must be interpreted with caution.

TABLE 2.—Estimates of Total Primary Employment and Wage Income Equations.

Independent Variables	Employment†	Wage Income ($10,000)†
L_1 = Distance to nearest SMSA core city (miles)	—0.447	
	(2.996)	
L_2 = Distance to nearest interstate highway interchange (miles)	—3.810*	—2.756
	(2.707)	(2.406)
C_1 = Local population (00)	0.806*	0.645
	(0.516)	(0.505)
C_2 = Full-time Chamber of Commerce representative	—50.037	—40.698
	(91.551)	(84.467)
C_3 = Unemployment rate (percent)		—5.8829
		(21.3522)
C_4 = Property tax rate (mills)	1.381	1.978
	(6.421)	(5.626)
P_1 = Size of park (acres)	0.705**	0.716**
	(0.368)	(0.353)
P_2 = Age of park (years)	33.138***	26.271***
	(8.796)	(8.169)
P_3 = Number of controls	66.998*	62.555**
	(41.513)	(36.518)
P_4 = Use restrictions	5.589	6.508
	(23.551)	(21.706)
P_5 = User restrictions	—28.958	—31.848
	(46.478)	(42.887)
P_6 = Improvements available	2.522	3.126
	(16.808)	(15.532)
P_7 = Speculative building	79.341	23.899
	(94.377)	(86.608)
P_8 = Railroad siding	213.013**	176.342**
	(82.627)	(76.788)
P_9 = Public sponsorship	71.142	80.396
	(76.499)	(71.956)
Intercept	—508.624	—499.7377
R^2	0.6969	0.6558
Adjusted R^2	0.5843	0.5280
F	5.5841	4.6277

†Standard errors of the coefficients appear in parentheses below the regression coefficients.
***Significant at the .01 probability level, $F_{(1\ 34)} = 7.44$.
**Significant at the .10 probability level, $F_{(1\ 34)} = 2.86$.
*Significant at the .20 probability level, $F_{(1,34)} = 1.71$.

Of the geographic location variables (L_1 and L_2), distance to an interstate highway interchange (L_2) is significant in the employment equation at the 20 percent level. Each additional mile of distance results in an estimated decrease of 3.8 jobs. Only one of the community variables is significant. Population of the local municipality (C_1) is significant in the employment equation at the 20 percent level and yields an estimated increase of 0.8 job for each additional 100 population.

Age of park (P_2) is significant at the 1 percent level and accounted for 33 jobs and $262,712 annual wage income for each additional year. Acreage of park (P_1) is significant at the 10 percent level and results in an estimated increase of 0.7 job and $7,163 of wage income for each additional acre. The availability of a railroad siding in the park (P_8) is also significant at the 10 percent level and accounts for 213 jobs and $1,763,422 of annual wage income. The number of methods used to control the park (P_3) accounts for 67 jobs and $625,547 of annual wage income per control added. None of the other variables was significant at the 20 percent level or higher.

IMPACTS PER ACRE MODEL AND RESULTS

Alternative measures of industrial park success are primary employment and wage income impacts per acre of park area. These per acre impact measures reflect employment and wage income density or intensity in a park. As such, they measure a park's ability to generate primary employment and wage income per unit of area and not in total as with the previous measures. The same geographic location, community, and park factors included in equation 2 are hypothesized to be related to the per acre measures. One exception is a hypothesized negative sign for the park acreage variable (P_1), which is based on the assumption that larger parks will tend to be utilized less intensively. The per acre impact model is stated as follows:

$$N/P_1 \text{ or } Y/P_1 = a - b_1 L_1 - b_2 L_2 + b_3 C_1 \ldots + b_6 C_4 - b_7 P_1 + b_8 P_2 \ldots + b_{15} P_9 + e \quad (3)$$

Table 3 includes the statistical results for the impact per acre equations. The independent variables included in Table 3 all have F-ratios greater than 1.0. These variables explained 70 percent of the variation in primary employment per acre and 67 percent of

TABLE 3.—Estimates of Primary Employment and Wage Income per Acre Equations.

Independent Variable	Employment per Acre†	Wage Income per Acre† ($10,000)
L_2 = Distance to nearest interstate highway interchange (miles)	—0.050***	—0.039***
	(0.014)	(0.012)
C_1 = Local population (00)	0.006**	0.005**
	(0.003)	(0.002)
C_3 = Unemployment rate (percent)	0.248**	0.175*
	(0.140)	(0.120)
P_1 = Size of park (acres)	—0.008***	—0.006***
	(0.002)	(0.002)
P_2 = Age of park (years)	0.292***	0.223***
	(0.051)	(0.044)
P_3 = Number of controls	0.477**	0.404**
	(0.232)	(0.199)
P_4 = Use restrictions	0.139	0.109
	(0.127)	(0.109)
P_8 = Railroad siding	1.374***	1.144***
	(0.463)	(0.398)
P_9 = Public sponsorship	0.648*	0.613*
	(0.446)	(0.383)
Intercept	—3.104	—2.6304
R^2	0.7041	0.6655
Adjusted R^2	0.6450	0.5986
F	10.3104	8.6127

†Standard errors of the coefficients appear in parentheses below the regression coefficients.
***Significant at the .01 probability level, $F_{(1,39)} = 7.31$.
**Significant at the .10 probability level, $F_{(1,39)} = 2.84$.
*Significant at the .20 probability level, $F_{(1,39)} = 1.70$.

the variation in primary wage income per acre. The F-ratios for both equations are significant at the 1 percent level.

The results for the impact per acre equations are similar to the results from the total impact equations in terms of primary explanatory variables. A major exception is the negative sign of the park acreage variable (P_1). This implies that as industrial parks increase in size, there is a corresponding decrease in employment and wage income density or impacts per acre. The significance levels tend to be higher with the per acre vs. the total impact equations, and three additional variables (local population C_1, unemployment C_3, and public sponsorship P_9) are significant in the per acre equations.

Population of the local municipality (C_1) is significant at the 10 percent level and accounts for 0.006 job per acre and $50 of annual wage income per acre for each additional 100 population. Average annual unemployment rate in the county (C_3) is positive and significant at the 10 percent level in the employment per acre equation and at the 20 percent level in the wage income per acre equation. Public sponsorship of the park (P_9) is positive and significant at the 20 (actually 12-15) percent level in both equations.

Earlier estimates including a variable on publicly subsidized utilities indicated that this aspect of public sponsorship was positively and significantly related to the various impact measures. It was dropped from the equation due to its high positive intercorrelation with the public sponsorship variable.

SUMMARY AND CONCLUSIONS

Industrial parks are a frequently suggested mechanism for achieving rural industrialization with its accompanying jobs and income. The primary thrust of this analysis has been identification of the locational, community, and park characteristics affecting the generation of primary employment and income by these industrial parks. Relatively complete information was obtained on 52 out of 72 industrial parks in nonmetropolitan Ohio by mail survey and phone follow-up in late 1974.

The average industrial park in the survey had 3.6 firms, 256 employees, and generated $1,961,826 of primary annual wage income. It was located 35 miles from an SMSA core city, 15 miles from an interstate highway interchange, and adjacent to a municipality of 12,695 (average) population. The average park also contained 137 acres and had been in existence for 7 years. Of the parks surveyed, 22 percent had made a speculative building shell available in the park, 59 percent had railroad sidings, and 46 percent were sponsored by a public vs. a private organization.

Utilizing multiple regression analysis, about two-thirds of the variation in primary employment and wage income generated by the parks was explained by the locational, community, and park factors included in the model. With total primary employment and income as the dependent variables, age of the park, acreage of the park, availability of a railroad siding in the park, and number of methods used to control the park were positive and significant independent variables at the 10 percent level or higher.

Impacts were also measured on the basis of primary employment and wage income per acre in the parks to determine the factors related to the density (impacts per acre) of employment and income generation. In this analysis, age of the park, availability of a railroad siding in the park, number of methods used to control the park, and average annual unemployment rate in the county during the life of the park were all positive and significant independent variables at the 10 percent level or higher. Distance to an interstate highway interchange and acreage of park were both negative and significant at the 10 percent level or higher.

All of the foregoing independent variables were significant in both the employment per acre and wage income per acre equations except for the unemployment variable. It was significant at the 10 percent level in the employment equation but not in the wage income equation. In addition, although public sponsorship of the park was not significant at the 10 percent level, it showed a much higher level of significance (at the 12 to 15 percent level) than any of the other "non-significant" variables included in the model.

A "young" park involves more risk to the potential occupants because there is little or no history of performance to observe. The presence of a railroad siding in the park facilitates low-cost transportation and may reduce rail transport time to markets. Nearness to an interstate highway interchange reduces transportation time and expands market advantages. Larger parks generally involve more total primary employment and wage income, but on a per acre basis, the larger the park, the smaller the employment and wage income density or impacts per acre. In other words, larger parks are generally less intensive in terms of employment and wage income generated per unit of area.

Various methods for controlling an industrial park (*e.g.*, purchase agreements, zoning ordinances, etc.) provide a legal framework for minimizing conflict situations among park occupants and between park occupants and residents of the surrounding area. Population of the local municipality acts as a proxy

for various commercial, industrial, and retail support establishments and health services, and may also serve as a labor force proxy. A higher average annual unemployment rate in the county during the life of the industrial park provides a potential pool of employees for firms in the industrial park. Public sponsorship of the park may reduce costs to occupants (*e.g.*, subsidized extension of utilities) and it may reflect favorable community attitudes toward industry.

Several factors were not found to be significant (at the 10 percent level) in primary income and employment generation. These include presence of a full-time Chamber of Commerce representative in the community, county property tax rate, distance to nearest SMSA core city, speculative building shell made available, and number of use or user restrictions, improvements, and services imposed or available.

These research results should be of interest and help to nonmetropolitan communities considering either the development of a new industrial park or the expansion or revitalization of an existing one. Three of the significant factors (population of the local municipality, distance to an interstate highway interchange, and age of the park) are not directly subject to control by any given local community, at least in the short run. However, they are factors which communities must consider prior to focusing on factors over which they have more direct control. Factors such as size of the park, control of the park, presence of a railroad siding, and public provision of the park and/or subsidies for utility extensions are largely under the control of the local community or private developer in the local community. It would appear that these factors in particular merit serious consideration in any nonmetropolitan industrial park development decisions.

Caution must be exercised in formulating specific policy recommendations from these statistical findings. Approximately one-third of the variation in both total and per acre primary employment and wage income is unexplained by the variables included in this analysis. Additional specification and analysis may be able to account for some of this unexplained variation.

The significance of age of park suggests that communities need to be psychologically and fiscally prepared to wait some time for a return on their industrial park investment. The average age of the nine unoccupied parks was 3 years compared to 12 years for the seven parks which were 75 percent or more occupied. The public sponsorship and community subsidized utility extension variables are dummy variables and as such do not reflect the nature and cost of utility extensions and other amenities provided to park occupants. Undoubtedly there are cases where the cost of the extensions may exceed the net employment and/or income benefits.

A final qualification is in order. This research focused on factors related to total and per acre primary income and employment generation from 52 industrial parks in nonmetropolitan Ohio. However, in addition to primary employment and income, there are other important considerations regarding the establishment or expansion of an industrial park. Examples include secondary income and employment impacts; fiscal impacts on local government expenditures and revenues; air, water, soil, and visual environmental impacts; and sociological impacts from such things as differing values of new immigrants and a higher proportion of working mothers. These factors are more difficult to quantify, but they must be considered, at least implicitly, if nonmetropolitan communities are to make wise decisions on industrial park development.

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APPENDIX I
GLOSSARY OF TERMS

For purposes of this research, definitions of specific terms are necessary. They are:

Conditions contained in leases: These conditions are restrictions, specified by the lessor, regulating the uses a firm (the lessee) may make of property, usually a building, within an industrial park. Violation of these conditions may result in termination of the lease.

Heavy manufacturing district: These districts are set aside for the use of major manufacturing operations. These operations typically require extensive community facilities and reasonable access to major thoroughfares; they may have extensive open storage and service areas, and may generate heavy traffic (2, p. 43). These operations often generate noise, odor, dust, smoke, and/or glare as by-products.

Individual deed restrictions: These are limitations, specified by the lessor, regulating the uses a firm (the purchaser) may make of property within an industrial park. Breach of these restrictions may result in a court injunction against the violator.

Industrial park—metropolitan: "An industrial park is a tract of land, the control and administration of which are vested in a single body, suitable for industrial use because of location, topography, proper zoning, availability of utilities and accessibility to transportation.

"The uses permitted are regulated by protective minimum restrictions including size of site, parking and loading regulations, and building set-back lines from front, side, and rear yards.

"The front yards, and side yards adjacent to streets, are to be landscaped in conformance to the planning standards set for the park.

"All requirements are to be compatible with the community and the surrounding land uses in accordance with a comprehensive plan to enable a group of industries to operate within it efficiently." (3, pp. 1-2)

Industrial park—nonmetropolitan: Few industrial park developments in nonmetropolitan areas meet the above definition as specified by the National Industrial Zoning Committee. If some of the stated specifications are relaxed, a development can be identified which the authors call an industrial park. Drawing general characteristics from the definition above, a nonmetropolitan industrial park may be defined as a tract of land set aside for industrial purposes and may be distinguished from other types of industrial land by four specific characteristics:

a. It is under single ownership and/or management.
b. There are utilities at least at the park boundary for hook-up to firms within the park.

c. The uses a firm may make of a park are regulated.

d. It is developed for the use of at least two different firms.

This study deals only with nonmetropolitan industrial parks. When the term "industrial park" is used, the authors are referring to nonmetropolitan developments.

Light manufacturing district: These are districts set aside for the use of manufacturing establishments which are clean, quiet, and free of hazardous or objectionable elements such as noise, odor, dust, smoke, or glare. They often operate entirely within enclosed structures and generate little industrial traffic. (2, pp. 42-43)

Nonmetropolitan: Communities with populations of less than 50,000 and counties with population densities less than 450 people per square mile.

Purchase agreements: These agreements are typically restrictions contained in a document of purchase which regulate the uses a firm may make of property within an industrial park. Breach of these agreements may result in a court injunction against the violator.

SMSA: Standard Metropolitan Statistical Area —a county or group of contiguous counties containing at least one city or twin cities with at least 50,000 population, and other criteria as defined for use in the 1970 Census of Population.

Zoning ordinances: ". . . a locally enacted law that regulates and controls private property. Zoning involves dividing the countryside into districts for agricultural, residential, commercial, and industrial purposes. The zoning law then states which specific uses are permitted in each district and under what circumstances." (4, p. 6)

APPENDIX II
FREQUENCY DISTRIBUTIONS OF SELECTED INDEPENDENT VARIABLES IN THE MODEL (n=52)

Population of Closest Municipality

Distribution	Frequency
0 - 2,399	4
2,400 - 4,999	9
5,000 - 9,999	11
10,000 - 19,999	20
20,000 - 29,999	4
30,000 - 39,999	3
40,000+	1

Distance to Closest SMSA (Miles)

Distribution	Frequency
0 - 24	12
25 - 50	33
50+	7

Distance to Nearest Interstate Highway Access (Miles)

Distribution	Frequency
0 - 2	13
3 - 9	13
10 - 19	12
20 - 29	6
30 - 44	4
45+	4

Size of Industrial Park (Acres)

Distribution	Frequency
0 - 39	7
40 - 99	18
100 - 199	19
200 - 299	3
300+	5

Age of Park (Years)

Distribution	Frequency
1 - 2	12
3 - 7	16
8 - 11	14
12 - 17	8
17+	2

Restrictions on Use of Park

Restrictions	Frequency
Landscaping is required	29
Use of signs is controlled	33
Building design and construction are controlled	25
Buildings have setback requirements	41
Residential construction prohibited	42
Off-street parking required	44
Off-street loading required	42
Outdoor storage is not permitted	7
If storage is permitted, must it be screened?	19
Does park have restrictions on percent of site permitted to be covered by building?	12
Is lessee or purchaser of property required to build on site within specified period of time?	19

Improvements Available in Park

Improvements	Frequency
Paved internal streets	29
Electric power	52
Water	51
Telephone	51
Sanitary sewer	45
Storm sewer	28
Paved accessories	50
Gutters	17
Curbs	15

APPENDIX III

COMPARISON OF GEOGRAPHIC LOCATION, COMMUNITY, AND PARK FACTORS IN THE EMPTY AND 75 PERCENT OR MORE OCCUPIED INDUSTRIAL PARKS IN NONMETROPOLITAN OHIO, 1974.

Factors	Empty Parks (n = 9) Mean	Empty Parks (n = 9) Percent	More Than 75% Occupied (n = 7) Mean	More Than 75% Occupied (n = 7) Percent
Georgraphic Location				
Distance to nearest SMSA core city (miles)	37			35
Distance to nearest interstate highway interchange (miles)	22			8
Community				
Population of local municipality	10,904		9,948	
Presence of full-time Chamber of Commerce representative		56		28
Community subsidized extension of utilities		44		86
Educational level of population (years)	11.5		11.9	
County property tax rate (mills)	41.1		57.9	
Park				
Size of park (acres)	147		106	
Age of park (years)	3		12	
Number of methods to control park	2.0		2.3	
Number of restrictions on use	6.3		5.6	
Number of restrictions on users	0.7		1.4	
Index of improvements available*	16.2		—	
Speculative building shell available		0		14
Presence of railroad siding		56		85
Number of services in park	1.6		2.7	
Park sponsored by public		11		57
Price concession given an occupant by seller		0		28
Sales price of land (per acre)	$6,889		$3,279	
Impacts				
Employment in park	0		568	
Wage income in park 1974)	0		$4,520,665	

*Each essential improvement weighted three times; i.e., electric power, paved access roads, sewer, telephone, and water (16).

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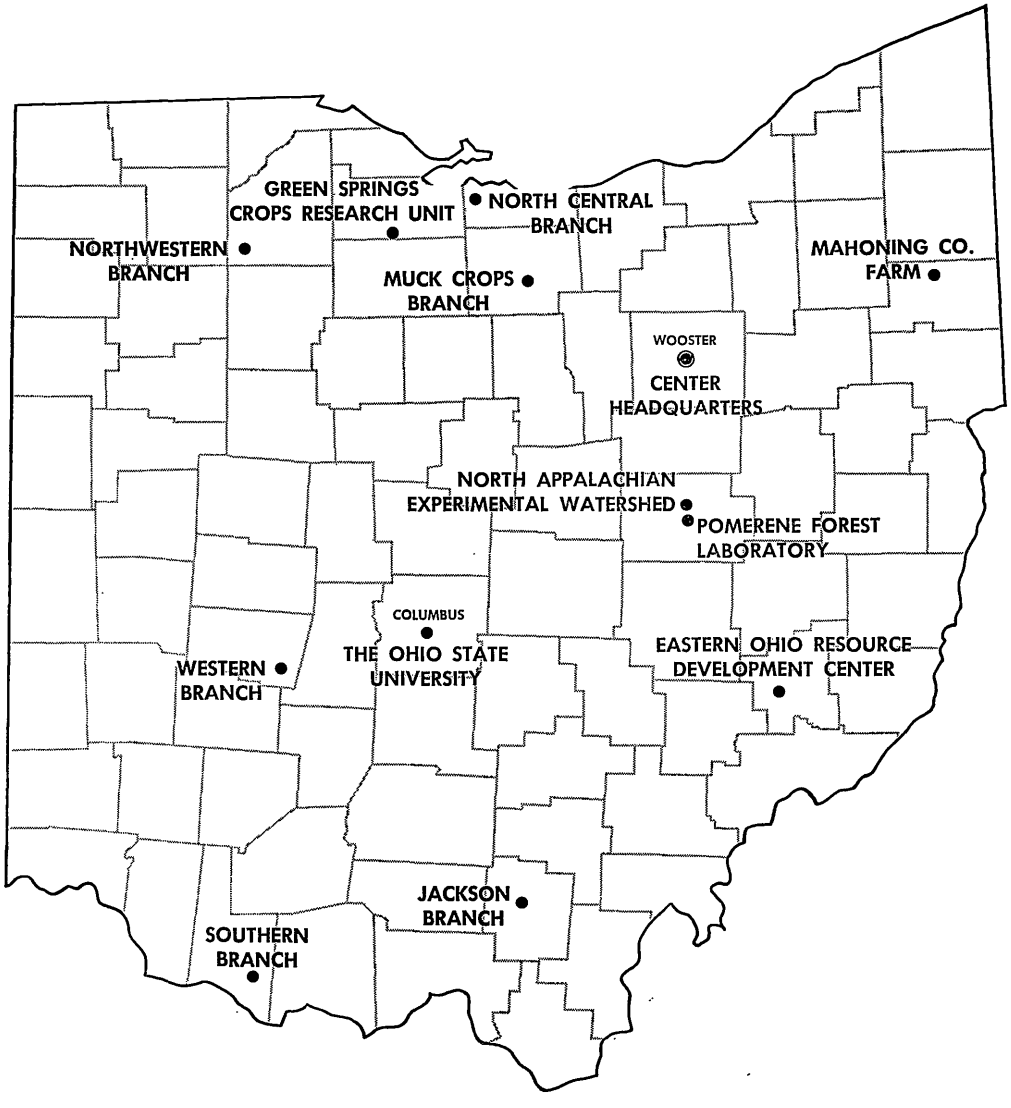

Ohio's major soil types and climatic conditions are represented at the Research Center's 13 locations.

Research is conducted by 15 departments on more than 7200 acres at Center headquarters in Wooster, eight branches, Green Springs Crops Research Unit, Pomerene Forest Laboratory, North Appalachian Experimental Watershed, and The Ohio State University.

Center Headquarters, Wooster, Wayne County: 1953 acres

Eastern Ohio Resource Development Center, Caldwell, Noble County: 2053 acres

Green Springs Crops Research Unit, Green Springs, Sandusky County: 26 acres

Jackson Branch, Jackson, Jackson County: 344 acres

Mahoning County Farm, Canfield: 275 acres

Muck Crops Branch, Willard, Huron County: 15 acres

North Appalachian Experimental Watershed, Coshocton, Coshocton County: 1047 acres (Cooperative with Agricultural Research Service, U. S. Dept. of Agriculture)

North Central Branch, Vickery, Erie County: 335 acres

Northwestern Branch, Hoytville, Wood County: 247 acres

Pomerene Forest Laboratory, Coshocton County: 227 acres

Southern Branch, Ripley, Brown County: 275 acres

Western Branch, South Charleston, Clark County: 428 acres